Minutes for Task Force on PD Testing of Class 1 Power Transformers

Chair: Donald E. Ayers

Vice Chair/Secretary: Javier Arteaga

Meeting Date: Monday 17th October of 2022

Time: 11:00 a.m. EDT

Total Attendance: 69

Members: 11

Guests: 58

Meeting was called to order at 11:00 AM by the Chair (Don Ayers).

The Patent and Copyright Slides were presented, no comments were made.

Membership requirements were explained.

The TF voting membership is 24 with quorum at 13 or more.

As 11 members were present, quorum was not attained.

The Chair then proceeded to display the Meeting Agenda.

Since no quorum was present an open discussion was held on the responses to the most recent survey of the Task Force on Revision Low Frequency Tests. There were 87 responses to the survey with 24 comments. The votes on C57.12.00-2021 Table 4 modification were 62 approved, 11 rejected and 14 abstained. The votes on verbiage changes in C57.12.90-2021 were 65 approved, 10 rejected and 12 abstained.

From the survey, 14 general areas were identified. They were:

1. Transformer misspelled on Table 4, sub-title.
2. Correct typos in notes on Table 4.
3. Add “by the purchaser” after specifically requested in Table 4 and in clauses 10.7, 10.8 and 10.8.1 of C57.12.90.
4. Change wording in 1.8.11 in C57.12.90 to read “Each Class II transformer and, when partial discharge test is specifically requested, each Class I transformer shall …”
5. Separate 10.8 into two sentences to clarify requirements. The same for 10.8.1.
6. Separate Clause 10.8 into separate clauses for Class II and Class I transformers.
7. Make other tests lengths other than just 1 hours available.
8. In 10.8.2 change terminal to terminals within red text.
9. Remove acceptance criteria for units below 34.5 kV.
10. Change title of Class I power transformers in Table 3 to clarify to be without PD tests.
11. Consolidate Class I information in Table 4 into Table 3.
12. Put changes into 10.7 not 10.8.
13. Acceptance levels to be 250 pC during the hour test and 50 pC increase during the 1 hour …

14. Change induced voltages for Class I transformers to line up with Class II voltage multipliers, 1.8X and 1.54X NSV.

A working group headed by Pugal Selvaraj made suggestions to accept items 1 to 8 and to hold for more discussions on items 9 to 14. An open discussion was then held on these items plus additional items raised from the floor. There were many comments to clarify that the PD test for Class I power transformers was very clear as an optional test, some suggesting completely separating Class I& II within the test. It was also noted that Class II PD requirements are under possible change so need to consider how to handle Class I units.

With no quorum it was decided that the items identified would be handled with either with an on-line session or email votes to achieve recommendations as to which items to accept and which to reject.

Finally, a motion to adjourn was approved unopposed.

Respectfully submitted
Donald E. Ayers
Chairman

Balloted Table 4 of C57.12.00

Table 4 - Dielectric Insulation levels for all windings of Class II power transformers, and Class I power transformers when partial discharge testing is specifically requested, voltages in kV

Maximum system voltage (kV rms)	Nominal system[a] voltage (kV rms)	Applied voltage test[g] (kV rms)			Induced voltage test[b,c] (phase to ground) (kV rms)		Winding line-end BIL[d] (kV crest)				Neutral BIL[e,g] (kV Crest)	
		Delta and fully Insulated wye	Grounded wye	Impedance grounded wye or grounded wye with higher BIL	Enhanced 7200 cycles	One hour	Minimum	Alternates			Grounded wye	Impedance grounded wye or grounded wye with higher BIL
Col 1	Col 2	Col 3	Col 4	Col 5	Col 6	Col 7	Col 8	Col 9	Col 10	Col 11	Col 12	Col 13
Class I power transformes with partial discharge testing												
1.5	1.2	10	10	10	1.4	1.2	**30**	**45**			45	45
3.5	2.5	15	15	15	2.9	2.5	**45**	**60**			60	60
6.9	5	19	19	19	5.8	5.1	**60**	**75**			75	75
11	8.7	26	26	26	10	8.8	**75**	**95**			95	95
17	15	34	34	34	17	15	**95**	**110**			95	110
26	25	50	34	40	29	25	**150**				95	125
36	34.5	70	34	50	40	35	**200**				95	150
48	46	95	34	70	53	46	200	**250**			110	200
73	69	140	34	95	80	70	250	**350**			110	250
Class II power transformers												
<=17	<=15	34	34	34	16	14	**110**				110	110
26	25	50	34	40	26	23	**150**				110	125
36	34.5	70	34	50	36	32	**200**				110	150
48	46	95	34	70	48	42	200	**250**			110	200
73	69	140	34	95	72	63	250	**350**			110	250
121	115	173	34	95	120	105	350	**450**	550		110	250
145	138	207	34	95	145	125	450	**550**	650		110	250
169	161	242	34	140	170	145	550	**650**	750	825	110	350
242	230	345	34	140	240	210	650	**750**	**825**	**900**	110	350
362	345	518	34	140	360	315	900	1050	1175		110	350
550	500	N/A	34	140	550[f]	475[f]	1425	1550	1675		110	350
765	735	N/A	34	140	880[f]	750[f]	1950[f]	2050			110	350
800	765	N/A	34	140	885[f]	795[f]	1950[f]	2050			110	350

[a] For nominal system voltage greater than maximum system voltage, use the next higher voltage class for applied test levels.

[b] Induced voltage tests shall be conduced at 1.58 x nominal system voltage for one hour and 1.8 x nominal system voltage for enhanced 7200 cycle test.

[c] Column 6 and Column 7 provide phse-to-ground test levels that would normall be applicable to wye windings. When the test voltage level is to be measured phase-to-phase (as is normally the case with delta windings), the levels in Column 6 and Column 7 must be multiplied by 1.732 to obtain the required phase-to-phase induced-

[d] Bold typeface BILs are the most commonly used standard levels

[e] Y-Y connected transformers using comm on solidly grounded neutral mayuse neuitral BIL selected in accordance with the l-voltage winding rating.

[f] For 500 kV to 765 kV nominal system voltages, induced voltage test levels do n ot follow rules in footnote b, and 1950 kV BIL is not a standard IEEE level.

[g] If user specifies a different BIL for the neutral than indicated above, the applied test voltage shall also be specified.

Balloted Verbiage on C57.12.90

April 12, 2022

Proposed Changes to IEEE Std. CS7.12.90-2021 to support proposed changes for PD Testing of Class I power transformers.

10.7 Induced-voltage tests for distribution and Class I power transformers when partial discharge testing is not specifically requested

10.8 Induced-voltage test for Class II power transformers and Class I power transformers, when partial discharge testing is specifically requested

10.8.1 General

Each Class II power transformer, and Class I power transformer, when partial discharge testing is specifically requested, shall receive an induced-voltage test with the required test levels induced in the high-voltage winding. The tap connections shall be chosen, when possible, so that test levels developed in the other windings during the one-hour test are x times their maximum operating voltages, as specified in Table 4 of IEEE Std C57.12.00-2021, where x (also referred to as the "overvoltage factor" in the text that follows) is the ratio of the test voltage on the high-voltage winding to the maximum operating voltage.

For a transformer built with a single magnetic core holding all windings, all windings are excited at a unique induction level, often referred to as "volts-per-turn." During an induced-voltage test, with the transformer connected and excited as in service, all windings are excited at the same overvoltage factor, regardless of what tap is selected. Each winding turn receives the same voltage. The tap connections shall be chosen, when possible, such that voltages developed across other windings meet or exceed the required overvoltage factor.

The situation is quite different when transformers are equipped with auxiliary devices with separate magnetic cores, such as preventive autotransformer (reactor), series (booster) transformer, or series regulator. Different magnetic cores can be excited at different levels during operation or testing. In certain tap positions, these auxiliary devices do not have their core excited at all and no voltage appears across their windings. For such cases, the selection of the tap-changer position shall be guided by the principles described below. One exception is when such auxiliary devices are not excited on a permanent basis but used only as transitional devices. If equalizing windings are used, the highest voltage impressed across the preventive autotransformer will occur in either the bridging or non-bridging positions. This is because the preventive autotransformer is energized in all tap positions (bridging and non-bridging).

NOTE 1-Equalizing windings are described in IEEE Std C57.131 and IEC 60214-1.

For transformers equipped with a series (booster) transformer, preventive autotransformer (reactor), or any other device, the selected tap position of the load tap-changer (LTC) shall be the one that produces the highest voltage across the windings of the series transformer, preventive autotransformer, and other auxiliary devices as applicable. There can be a conflict of choosing such a tap position when more than one such device is present. In such a case, the selected tap position of the LTC should be the best compromise so that all devices are tested with overvoltage. One common example is the case where a series transformer and preventive autotransformer are both present. In this case, the tap selected shall be the one that is closest to the position that produces the highest voltage across the windings of the series transformer and simultaneously excites the preventive autotransformer, which is typically a bridging position (not applicable when the preventive autotransformer is energized only during transition).

In order to test the series (booster) transformer, preventive autotransformer, and other devices, at the required minimum overvoltage factor, the voltage developed on the terminals of other windings may exceed the one-hour level mentioned in Table 4 of IEEE Std C57.12.00-2021. In such cases, an alternative tap position may be selected by agreement between the manufacturer and the purchaser to avoid overstressing components such as bushings. Annex D shows examples that can serve as a guide to select the LTC tap position for transformers having series (booster) transformer and/or preventive autotransformers.

For certain types of devices such as series reactors used as current limiting devices, there is no voltage developed across their windings during the induced voltage test as these devices are only excited when current flows in their windings. There is no option available to apply any overvoltage for these devices during the induced test.

NOTE 2-The selection of the tap-changer position for induced test should be agreed upon between manufacturer and purchaser prior to design to avoid conflicts during final acceptance tests.

10.8.2 Test procedure

The voltage shall first be raised to the one-hour level and held for a minimum of 1 min or until a stable partial discharge level is obtained to verify that there are no partial discharge problems. The level of partial discharges shall be recorded just before raising the voltage to the enhancement level. The voltage shall then be raised to the enhancement level and held for 7200 cycles. The voltage shall then be reduced directly to the one-hour level and held for 1 h.
During this 1 h period, partial discharge measurements shall be made at 5 min intervals. Partial discharge acceptance criteria shall be based on each line terminal rated 69 kV and above. For Class I power transformers partial discharge acceptance criteria shall be based on the highest rated voltage terminal. These measurements shall be made in accordance with 10.9.

The pressure inside the transformer tank during the induced test shall not be increased by artificial means for the purpose of reducing the PD level. The liquid level and pressure inside of the transformer tank and/or conservator tank shall be configured such that the oil head pressure during the induced test does not exceed the pressure under usual service conditions. Any exceptions that increase tank pressure by more than 3.5 kPa (0.5 psi) over normal operating pressure, such as the use of an elevated test facility conservator tank, requires customer approval prior to test. A note shall be added to the certified test report confirming this approval.

NOTE-Increasing the pressure for diagnostic purposes, such as to identify and possibly reduce suspected bubbles in the liquid, may be done as a remedial step to diagnose a source of high PD. To be considered valid, the test needs to be repeated with no added pressure as stated previously.

10.8.3 Connections

The transformer shall be excited exactly as it will be in service. The voltage may be induced from any winding or from special windings or taps provided for test purposes. Single-phase transformers shall be excited from single-phase sources. Three-phase transformers shall be excited from three-phase sources. The neutral terminals and other terminals that are normally grounded in service shall be solidly grounded. This will stress all of the insulation at the same per unit of overstress.

10.8.4 Frequency

The test frequency shall be increased, relative to operating frequency, as required to avoid core saturation. The requirements in 10.7.2 are also applicable in the case of this induced test.

10.8.5 Failure detection

Failure may be indicated by the presence of smoke and bubbles rising in the insulating liquid, an audible sound such as a thump, or a sudden increase in the test current. Any such indication shall be carefully investigated by observation, by repeating the test, and by other diagnostic tests to determine whether a failure has occurred. In terms of interpretation of partial discharge measurements, the results shall be considered acceptable and no further partial discharge tests required under the following conditions:

10.8.5.1 Class II Power Transformer

a) The magnitude of the partial discharge level does not exceed 250 pC during the 1 h test period.

b) The increase in partial discharge levels during the 1 h period does not exceed 50 pC.

c) The partial discharge levels during the 1 h period do not exhibit any steadily rising trend, and no sudden sustained increase in the levels occurs during the last 20 min of the test.

10.8.5.2 Class I Power Transformer

a) The magnitude of the partial discharge level does not exceed 500 pC during the 1 h test period.

b) The increase in partial discharge levels during the 1 h period does not exceed 150 pC.

c) The partial discharge levels during the 1 h period do not exhibit any steadily rising trend, and no sudden sustained increase in the levels occurs during the last 20 min of the test.

10.8.5.3 General

Judgment should be used on the 5-rnin readings so that momentary excursions of the partial discharge readings caused by cranes or other ambient sources are not recorded. Also, the test may be extended or repeated until acceptable results are obtained.

A failure to meet the partial discharge acceptance criterion shall not warrant immediate rejection, but it shall lead to consultation between purchaser and manufacturer about further investigations.

		C57.12.00			C57.12.90			
Name	**Organization**	**Approve**	**Reject**	**Abstain**	**Approve**	**Reject**	**Abstain**	**Comments**
Hugo Flores	Hitachi Energy	X			X			
Onome Avanoma		X			X			
Peter Heinzig	Weidman Group	X			X			
Nitesh Patel	Hyundai Power Transformers	X			X			
Alexander Winter	HighVolt	X			X			
Ion Radu	Hitachi Energy	X			X			
Sheldon Kennedy	Niagara Transformer	X			X			
Mark Shem-Tov	VRT Transformer	X			X			
John Lackey	PowerNex Associates	X			X			
Pierre Riffon	Pierre Riffon Consultant	X			X			
Les Reckseidler		X			X			
Alain Bolliger	HV Technologies	X			X			
Suresh Babanna	Prolec-GE Waukesha	X			X			
Hemchandra Shertukde	Hartford University	X			X			
Sanjay Patel	Smit	X			X			
Jeffrey Britton	Doble	X			X			
Weijun Li	Braintree Electric Light	X			X			
Steven Brzoznowski	BPA	X			X			
David Wallach	Duke Energy	X			X			
John Herron		X			X			
Vladamir Khalin	KV Consulting	X			X			
Mark Lachman	Prolec Energy	X			X			
Mario Locarno	Doble	X			X			
Joseph Melanson	Consultant	X			X			
Kris Neild	Megger	X			X			
Axel Kramer	Reinhausen	X			X			
Stephen Jordan	TVA	X			X			
Harry Pepe	Penix Technologies	X			X			
Roger Hayes	GE Renewable Energy	X			X			
Craig DeRouen		X			X			
T. Spitzer		X			X			

Neil Kranich		X			X			
Michael Franchek		X			X			
Polo Rodriguez	Consultant	X			X			
Arup Chakraborty	Delta Star	X			X			
Zan Kiparizoski	Howard Industries	X			X			
Phillip Hopkinson	Hvolt Inc	X			X			
Kris Zibert	Allgeier Martin	X			X			
Wally Bender		X			X			
Marnie Roussell	Entergy	X			X			
Shawn Gossett	Ameren	X			X			
Poorvi Patel		X			X			
Peter Kleiner	U. S. Army	X			X			
Mike Waldrop		X			X			
James McIver	Siemens Energy	X			X			
Rodrigo Ronchi	WEG	X			X			
Donald Platts	Consultant	X			X			
Shibao Zhang		X			X			
Larryt Christodoulou		X			X			
Scott Dennis	Hitachi Energy	X			X			I accept but with comments on the proposed table 4 as it has “transformers” misspelled as highlighted in yellow below.
Larry Dix	Quality Switch	X			X			Comment – do we really want to have the option for PD testing a class I transformer below 5 kV? If that has been discussed I may have missed that but it does seem to open up a door that might bring unintended consequences.
George Partyka, Jr.	PTI Transformers	X			X			I do have one comment and that is to add “by the purchaser” after all instances of “specifically requested”. In my opinion, this is to just be consistent with the wording found in the standard.
Eric Davis	Burns & McDonnell	X			X			Table 4 Accept as noted - does not match Table 3.
Steve Snyder		X			X			It will also be necessary to slightly change the text in Clause 5.10 (C57.12.00) where it describes the contents of Table 4.
Jason R. Varnell		X			X			There is a typo in Table 4 as it reads "Class I power transformes" instead of "transformers".
Scott Dennis	Hitachi Power Grids	X			X			I accept but with comments on the proposed table 4 as it has “transformers” misspelled as highlighted in yellow below
George Jr.	PTI Transformer	X			X			I do have one comment and that is to add “by the purchaser” after all instances of “specifically requested”. In my opinion, this is to just be consistent with the wording found in the standard

Bruce Forsyth	Bruce Forsyth & Assoc.	X				X		Regarding the proposed changes to C57.12.90-2021, my vote is **REJECT** because the first sentence of 10.8.1 as written implies the requirement for partial discharge testing to be specifically requested applies to <u>both</u> Class I and Class II transformers, and that is not the intent of the proposed changes. I am willing to change my vote to **ACCEPT** if the first sentence of 10.8.1 is reworded. If the sentence is changed to "*Each Class II transformer and, when partial discharge is specifically requested, each Class I transformer shall receive…"* I am willing to change my vote to **ACCEPT**. Note that I support the spirit of the change and only want to eliminate any ambiguity regarding the "specifically requested" requirement.
Kyle D Stechschulte	AEP	X				X		The proposed language suggests that Class II transformers now require PD tests to be *specifically requested*. My suggested changes: 10.8 Induced-voltage test for Class I power transformers when partial discharge testing is specifically requested and all Class II power transformers 10.8.1 Each Class I power transformer when partial discharge testing is specifically requested and all Class II power transformers shall….
Raj Ahuja		X				X		Reject - OR Accept with following changes: The acceptance levels should be the same as that of Class II power transformers. a. 250 pC acceptance level during 1 hour test b. 50 pC increase during 1 hour test. -
Bertrand Poulin	Hitachi Energy	X				X		I strongly believe that mixing Class I and class II transformers in clause 10.8 is going the wrong way. I also strongly believe that specifying a one hour test for class I transformers is also going the wrong way. If the only option is to specify the one hour test or not to specify any pd test, many people will not specify this one hour test knowing that this makes no sense. It is simply not possible to test a large volume of transformers for one hour (actually slightly more) each. A pd test should be a quality test, not a design test and therefore, should be considered a routine test. Class I transformers deserve their own test for PD, and it should be a shorter test so that it can be done as routine.
Alexander Kraetge		X				X		My rejection is based on: 500 pC acceptance level during 1 hour test AND 150 pC increase during 1 hour test. Both values are too high for an effective quality assessment. If we already question the 250pC for Class II transformers as being quite high, accepting 500pC as still OK for smaller transformers does not make sense to me, even though I understand your motivation as explained. I propose to take the values as for Class II transformers.
Shamaun Hakan	WEG		X		X			Table is not following 1.81 and 1.52 rules for modified (red colored) items.
Eric Schleisman n	Southern Company		X		X			The section 10.8 title is not clear. The wording implies that partial discharge testing of class II power transformers is only required when specifically requested. For clarity, I recommend the following: "Induced-voltage test with partial discharge measurement for Class II power transformers. Induced-voltage test for Class I power transformers, when partial discharge testing is specifically requested."

								Section 10.8.1 is not clear. Again the wording implies that partial discharge testing of class II power transformers is only required when specifically requested. For clarity, I recommend the following: "Each Class II power transformer shall receive an induced-voltage test with the required test levels induced in the high-voltage winding. Additionally, Class I power transformers shall receive an induced-voltage test with the required test levels induced in the high-voltage winding when partial discharge testing is specifically requested."
								Section 10.8.5.2 should not differentiate between Class II and Class I transformers. Class I power transformers should also have to meet the same 250pC test limit as Class II transformers. My company specifies 250pC as a limit for Class I transformers, and our purchased transformers easily meet the limit.
Ajith Varghese	Prolec-energy		X		X			Table 4 have many typo error and Voltage Table doesn't agree with 1.8 X and 1.54X NSV
Mark Perkins			X		X			For changes to C57.12.90 I accept with a small editorial change. Since a three phase transformer has three terminals the word Terminal should be terminals
								For changes to C57.12.00 I don't think it is often feasible to measure PD below 500 pC on terminals below 34.5 kV so I would make a note saying it is not recommended to have an acceptance criteria on terminals below 34.5kV. With this change I would accept the proposal
Chris Baumgartner	We Energies		X		X			Reason for rejection: The values in Columns 6 and 7 are different in Table 4 for Class I and Class II. These should be the same, or Footnote b should be revised to state the correct multipliers for Class I tests. Other comments (not reason for rejection): 1. Correct typos in footnotes of Table 4 – c, "normall"; e, "comm on" "mayuse" "neujtral" and "l-voltage"; f, "do n ot" 2. I suggest revising Table 3 to clarify that it applies to Class I when partial discharge testing is not specifically requested; Title would be "…and Class I power transformers when partial discharge testing is not specifically requested, voltage in kV" and heading for Class I in table would be "Class I power transformers without partial discharge testing"
Kenneth Skinger	Scituate Consulting			X	X			
Charles Sweetser	Omicron Entergy			X	X			
Anthony Franchitti	PECO Energy		X			X		I think the 1-hr and the 1-hr increase criteria should be the same as Class II criterial.
George Frimp	Hitachi Energy		X			X		My vote is reject, only because the numbers for the phase-to-ground enhanced and one hour test voltage levels do not correspond to what is actually calculated using the notes b and c. Below are the numbers I calculate for columns 6 and 7 for the Class I transformers :
								(kV rms) Col 1 (Ph-Grd) Col 6 (Ph-Grd) Col 7
								1.2 1.2 1.1
								2.5 2.6 2.3
								5.0 5.2 4.6
								8.7 9 8
								15.0 16 14

								25.0 26 23 34.5 36 32 46 48 42 69 72 63 There are two typos in Note c as noted below: [c]Column 6 and Column 7 provide phase-to-ground test levels that would normally be applicable to wye windings. When the test voltage level is to be measured phase-to-phase (as is normally the case with delta windings), the levels in Column 6 and Column 7 must be multiplied by 1.732 to obtain the required phase-to-phase induced-voltage test level.
Daniel Blaydon	Baltimore G&E		X			X		Modifications to Table 4: I suggest that an additional column for the one-hour level be added to Table 3 with a footnote that this column only be used when PD testing is specified. Expanding Table 4 with duplicate information is not necessary. Requirements for Class I PD testing: PD limits for Class I transformers should not be different than Class II transformers. The limits for Class II transformers were reduced because it was recognized that they were much higher than what has been generally accepted by both end users and manufacturers for many years and to align with IEC standards. There is no apparent technical basis for waiting to reduce PD limits for Class I transformers based on testing data (as is suggested) as some end users are already specifying Class II PD testing for Class I transformers without issue. This will ultimately create more confusion in the standard since the difference in PD limits essentially creates a different test.
Santosz			X			X		I am okay with the general idea of this proposal and glad to see that some test levels are added to C57.12.0 since they aren't there now. However, I do not approve this proposal. My comments follow: • I suggest the phrase "when PD testing is specifically requested" be changed. To me this opens up questions such as 'requested by whom and when and how'. It should be more formal such as: "when PD testing has been agreed between purchaser and manufacturer". This is the verbiage used throughout the standards • Since PD testing is an OTHER test for Class I as defined in Table 17 of C57.12.00, it is only to be done when agreed. I suggest something be added to Table 17 that describes the intent of this change since it seems kind of special. • In C57.12.00, Table 3 is for Class I and Table 4 is for Class II. This new proposal distorts this by replicating much information in Table 4 that is already in Table 3. I would rather see Table 3 revised to include the test levels and leave Table 4 unchanged. • In C57.12.90, subclause 10.7 is for Class I and 10.8 is for Class II. This new proposal suggest changes mostly to 10.8. I suggest it should be the other way around; make major changes to 10.7 and not 10.8. It could be that 10.7 refers to 10.8 if PD testing has been agreed to. • I am surprised that the acceptance criteria is set at the old level of 500/150 pC and not the new level of 250/50 pC
Shakim	WEG		X		X			Proposed Changes to C57.12.00-2021, Table 4 : REJECT. Table is not following 1.81 and 1.52 rules for modified (red colored) items

Stephen Antosz			X			X		I don't personally get involved with many Class I power transformers, but when I do I like to see the Class II PD testing done on them. So I am okay with the general idea of this proposal and glad to see that some test levels are added to C57.12.0 since they aren't there now. However, I do not approve this proposal. My comments follow: · I suggest the phrase "when PD testing is specifically requested" be changed. To me this opens up questions such as 'requested by whom and when and how'. It should be more formal such as: "when PD testing has been agreed between purchaser and manufacturer". This is the verbiage used throughout the standards. · Since PD testing is an OTHER test for Class I as defined in Table 17 of C57.12.00, it is only to be done when agreed. I suggest something be added to Table 17 that describes the intent of this change since it seems kind of special. · In C57.12.00, Table 3 is for Class I and Table 4 is for Class II. This new proposal distorts this by replicating much information in Table 4 that is already in Table 3. I would rather see Table 3 revised to include the test levels and leave Table 4 unchanged. · In C57.12.90, subclause 10.7 is for Class I and 10.8 is for Class II. This new proposal suggest changes mostly to 10.8. I suggest it should be the other way around; make major changes to 10.7 and not 10.8. It could be that 10.7 refers to 10.8 if PD testing has been agreed to. · I am surprised that the acceptance criteria is set at the old level of 500/150 pC and not the new level of 250/50 pC.
Durant Stacy	Hitachi Energy			X			X	
Scott Digby	Duke Energy			X			X	
Kyle Heiden	Eaton			X			X	
Bruce Webb	Knoxville Utility Board			X			X	
Mickel Saad	Hitachi Energy			X			X	
Jos Veens	Smit Nymegan			X			X	
Markus Scheissl	SGB-Smit			X			X	
Samuel Brodeur	Hitachi Energy			X			X	
Peter Sheridan	SGB-USA			X			X	
Darren Brown	Howard Industries			X			X	
Eric Weatherbee	Pcore Electric Company			x			x	
Jarrod Prince	Ermco-ECI			X			X	Should 10.7 have a General Section or another Section added to clearly state when the Induced-voltage test should be performed based on the requirement of a PD test or not and therefore not change the Title of this Section. This same comment would apply to 10.8 as well but to do so in the General Section already established or in another Section to be added.

Total Respondants								
87		**62**	**11**	**14**	**65**	**10**	**12**	